the Weber-Fechner formula, if the wave-frequencies be made a function of the constant; (7) the relation of the spectral energy to the presentation time may also be approximately expressed in the Tröndle formula, the wave-frequency being made a function of the constant.—WM. CROCKER.

Breeding for disease resistance.—It has been a popular impression that newly produced disease resistant varieties will gradually lose their immunity in later generations. The idea was that such new varieties might sometimes become slightly infected; this short sojourn of the disease organism in the normally immune host would enable the former to adapt itself to the new conditions and gradually acquire virulence, until finally a new biologic form was developed to which the host in question was quite susceptible. EVANS[8] carried the same idea further when he found that a cross between resistant and susceptible races of wheat produced a hybrid even more susceptible to rust than the susceptible parent. Furthermore, rust from the hybrid could now infect the immune parent. Such facts were very discouraging, since they indicated that the artificial breeding of resistant crop plants is rapidly overtaken by the natural breeding of new biologic forms of the disease organism.

Particularly acceptable, therefore, is the work of STAKMAN, PARKER, and PIEMEISEL,[9] who find that wheats resistant to rust remain resistant regardless of the previous history of the rust; the gap between immune and susceptible varieties is not bridged by transitional varieties or by artificial hybrids. "Resistance is rather an hereditary character, which cannot be produced by the accumulation of fluctuating variations within a susceptible line, nor broken down by changes in the host or parasite." Acceptable as such a conclusion may be, both to commercial breeders and to academic geneticists, it is very questionable how widely it may be applied. It will be difficult, although not hopeless, to explain away much of the contrary evidence.—MERLE C. COULTER.

Nature of monocotyledonous leaves.—Mrs. ARBER[10] has presented the results of an anatomical investigation of the phyllode theory of the monocotyledonous leaf. According to DECANDOLLE, it is equivalent to the leaf-base and petiole of a dicotyledonous leaf, but Mrs. ARBER believes that certain monocotyledonous leaves are still further reduced in that they are equivalent to leaf-bases only. In case the monocotyledonous leaf shows a distinction of petiole and blade, HENSLOW suggested that the blade is merely an expansion

[8] EVANS, I. B. P., South African cereal rusts, with observations on the problem of breeding rust resistant wheats. Jour. Agric. Sci. 4:95–104. 1911.

[9] STAKMAN, E. C., PARKER, JOHN H., and PIEMEISEL, F. J., Can biologic forms of stem rust on wheat change rapidly enough to interfere with breeding for rust resistance? Jour. Agric. Research 14:111–123. *pls. 13–17.* 1918.

[10] ARBER, AGNES, The phyllode theory of the monocotyledonous leaf, with special reference to anatomical evidence. Ann. Botany 32:465–501. *figs. 32.* 1918.